C. REMARKS/ARGUMENTS

1. Status of the Claims

Claims 1-22 are currently pending. Claims 1 and 21 are independent. Claims 2-20 and claim 22 depend on claim 1.

Applicant notes with appreciation that claims 3 and 4 have been objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form. Applicant has not rewritten claims 3 and 4 in independent form, in the belief that claim 1, upon which claims 3 and 4 depend, is allowable, as explained in detail in section 3 below.

2. Objection to the Drawings

The drawings have been objected to as not including reference signs mentioned in the description. In response, Applicant hereby submits a corrected drawing for Fig. 1, which includes all the reference signs mentioned in the corresponding description.

3. Rejection of Claims 1-2 and 5-22 Under 35 U.S.C. 102(b)

Claims 1-2 and 5-22 have been rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Pat. No. 5,428,658 to Oettinger (henceforth "Oettinger").

The Examiner states:

"Oettinger et al. discloses an x-ray source with a flexible probe. The probe generates therapeutic radiation as described in connection with the figure drawings (see e.g. Fig. 20A and 22). Of critical importance to the limitations of the instant claims at issue, is the non-planar target. Such target 228, 228A is clearly shown by Oettinger et al. All limitations of the claims at issue in their present form are meet by Oettinger et al."

Applicant respectfully disagrees.

Applicant respectfully submits that, contrary to the Examiner's statements, all limitations of the claims at issue in their present form are not met by Oettinger, because Oettinger does not teach or suggest at least the following limitations of claims 1 and 21:

A. "a therapeutic radiation source" that includes "a thermionic cathode having an electron emissive surface" together with "a source of optical radiation." (This combination of limitations is present in both claims 1 and 21.)

B. "wherein said optical delivery structure is adapted for directing a beam of said transmitted optical radiation upon a surface of said cathode, said beam of optical radiation having a power level sufficient to heat at least a portion of said surface to an electron emitting temperature so as to cause thermionic emission of electrons from said surface." (This limitation is present in claim 1.)

C. "said optical delivery structure being adapted for directing a beam of said transmitted optical radiation upon a surface of said thermionic cathode, wherein said beam of optical radiation has a power level sufficient to heat at least a portion of said surface to an electron emitting temperature so as to cause thermionic emission of electrons from said surface." (This limitation, very similar to limitation B above, is present in claim 21.)

Regarding limitation A above, Oettinger neither teaches nor suggests any therapeutic radiation source that includes a combination of a thermionic cathode, together with an optical source. In contrast, Oettinger explicitly states that a thermionic cathode be driven by a power supply (as opposed to being driven by an optical source, as in the present invention), and discloses a photocathode (as opposed to a thermionic cathode) as the electron source, when a source of optical radiation (such as a laser) is used in the therapeutic radiation source to drive the electron source. See e.g. Oettinger Col. 9, lines 5-9: ("The electron beam generator 22 may include a thermionic emitter (driven by a floating low voltage power supply) or a photocathode (irradiated by an LED or laser source);" Oettinger Col. 12, lines 7-11 (". . . the electron beam generator includes a thermionic emitter 22 driven by the power supply 12A. In operation, power supply 12A heats the thermionic emitter 22, which in turn generates electrons . . . "); Oettinger Col. 12, lines 19-22 ("Also illustrated, is an alternative electron beam generator which includes a photoemitter 22 irradiated by a light source 56 . . . ").

Nowhere in Oettinger is it taught or suggested that an optical source (e.g. a laser) be used together with a thermionic cathode, i.e. that a laser be used to heat the thermionic cathode to cause thermionic emission of electrons. Therefore, Oettinger does not teach or suggest limitation A above.

Regarding limitations B and C above, Oettinger does not teach or suggest any optical delivery structure that is adapted to direct "a beam of transmitted optical radiation upon a surface of a cathode," where the beam of optical radiation has "a power level sufficient to heat at least a

portion of said surface to an electron emitting temperature so as to cause thermionic emission of electrons from said surface."

The present application repeatedly discloses the use of a laser to heat a thermionic cathode. See e.g. specification page 6, lines 2-3 ("The present invention is directed to an optically driven x-ray source having a laser-heated thermionic cathode."); page 6, lines 15-18 ("The fiber optic cable directs a beam of the transmitted optical radiation upon the electron emissive surface of the cathode . . . The beam has a power level sufficient to heat at least a portion of the surface to an electron emitting temperature, so as to cause thermionic emission of the electrons from the surface"); page 15, lines 11-14 ("In operation, the laser beam shining down the fiber optic cable 213 impinges upon the surface of the thermionic cathode 222, and rapidly heats the surface to an electron emitting temperature, below the melting point of the metallic cathode 222. Upon reaching of the surface of a electron emitting temperature, electrons are thermionically emitted from the surface"). The present application also describes the advantages of using such a laser heated thermionic cathode. See e.g. specification page 9, lines 3-9 ("The present invention . . . includes an electron-beam activated therapeutic radiation source, and . . . uses a laser-heated thermionic cathode to significantly reduce the power requirements.")

In contrast, in Oettinger, the fiber optic cable is described as transmitting light onto a photocathode, as opposed to a thermionic cathode, and the photocathode is described as generating free electrons by photoemission. See Oettinger Col. 6, lines 48-53 (". . . a photoemissive element (i.e. a photocathode) is located, along with a target element, in the target assembly . . . a flexible fiber optical cable, which couples light from a laser source to the photocathode, can form the basis for the flexible probe."); Oettinger Col. 25, lines 7 – 10 and 19-21 ("In operation, the small semiconductor laser 220 shining down the fiber optic cable 202 activates the transmissive photocathode 216 which generates free electrons 222. . . . the photoemissive surface which forms cathode 216 can . . . be quite small.") It is well known in the art that photoemission occurs due to the photoelectric effect, and has nothing do to with thermionic emission of electrons, i.e. heating of a thermionic cathode to an electron emitting temperature. Therefore, Oettinger teaches away from the invention of the present application.

Nowhere in Oettinger is there any teaching or suggestion of the limitations B and C above, namely that a fiber optic cable (or other optical delivery structure) be adapted to direct a

beam of transmitted optical radiation upon a surface of a cathode, where the beam of optical radiation has a power level sufficient to heat at least a portion of the surface to an electron emitting temperature so as to cause thermionic emission of electrons from the surface.

For these reasons, Applicant submits that Oettinger fails to teach or suggest the above-mentioned limitations of independent claim 1 and 21 of the present application, and therefore that independent claims 1 and 21 are allowable, and not anticipated under 35 U.S.C. § 102 (b) by Oettinger.

Applicant also submits that claims 2, 5-20, and 22, which all depend on claim 1 and therefore include all the limitations of claim 1, are also allowable as depending from an allowable base claim.

In summary, for all of the reasons discussed above, Applicant respectfully requests that the rejection of claims 1-2 and 5-22 under 35 U.S.C. § 102(b) as being anticipated by Oettinger be withdrawn.

3. Conclusion

On the basis of the foregoing amendments, Applicant respectfully submits that all of the pending claims are in condition for allowance. An early and favorable action is therefore earnestly solicited. If there are any questions regarding these amendments and remarks, the Examiner is encouraged to contact the undersigned at the telephone number provided below.

Respectfully submitted,

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